

APPENDIX J
Gastrointestinal Assessment

TABLE J-1.
Dependent Variable-Covariate Associations for the Gastrointestinal Assessment

Dependent Variable	Level	Age			p-Value	Race		p-Value
		Born ≥1942	Born 1923-1941	Born ≤1922		Black	Nonblack	
Hepatomegaly	Abnormal	(n=949) 0.8%	(n=1,246) 1.4%	(n=84) 0.0%	0.255	(n=134) 0.7%	(n=2,145) 1.2%	0.999
AST (continuous) ^a (discrete)	High	(n=948) 4.5%	(n=1,240) $r=-0.001$ 4.5%	(n=84) 3.6%	0.973 0.918	(n=134) $\bar{x}=27.7$ 6.7%	(n=2,138) $\bar{x}=25.6$ 4.3%	0.004 0.286
ALT (continuous) ^a (discrete)	High	(n=948) 14.3%	(n=1,240) $r=-0.109$ 10.0%	(n=84) 4.8%	<0.001 0.001	(n=134) $\bar{x}=20.7$ 10.4%	(n=2,138) $\bar{x}=20.6$ 11.7%	0.876 0.788
GGT (continuous) ^a (discrete)	High	(n=948) 8.0%	(n=1,240) 0.007 8.8%	(n=84) 2.4%	0.737 0.112	(n=134) $\bar{x}=44.1$ 14.9%	(n=2,138) $\bar{x}=32.3$ 7.8%	<0.001 0.011
Alkaline Phosphatase (continuous) ^a (discrete)	High	(n=948) 3.9%	(n=1,240) 7.1%	(n=84) 0.054 0.163	0.615 0.220	(n=134) $\bar{x}=92.9$ 7.5%	(n=2,138) $\bar{x}=91.7$ 4.7%	0.615 0.220

TABLE J-1. (continued)

Dependent Variable-Covariate Associations for the Gastrointestinal Assessment

Dependent Variable	Level	Age			p-Value	Race		p-Value	
		Born ≥1942	Born 1923-1941	Born ≤1922		Black	Nonblack		
J-2	Total Bilirubin (continuous) ^b (discrete)	High	(n=948) r=0.043	(n=1,240) r=0.008	(n=84) 2.4%	0.042 0.320	(n=134) $\bar{x}=0.76$ 4.5%	(n=2,138) $\bar{x}=0.78$ 3.3%	0.268 0.580
			4.0%	2.9%	2.4%				
	Direct Bilirubin (continuous) ^b (discrete)	High	(n=948) r=0.008	(n=1,240) r=0.008	(n=84) 0.0%	0.695 0.156	(n=134) $\bar{x}=0.15$ 6.0%	(n=2,138) $\bar{x}=0.16$ 3.9%	0.511 0.342
			4.1%	4.3%	0.0%				
	LDH (continuous) ^a (discrete)	High	(n=948) r=0.102	(n=1,240) r=0.079	(n=84) 2.4%	<0.001 0.620	(n=134) $\bar{x}=131.2$ 0.8%	(n=2,138) $\bar{x}=127.7$ 1.3%	0.135 0.999
			1.2%	1.2%	2.4%				
	Cholesterol (continuous) ^a (discrete)	High	(n=948) r=0.079	(n=1,240) r=0.079	(n=84) 10.7%	<0.001 0.018	(n=134) $\bar{x}=211.2$ 10.4%	(n=2,138) $\bar{x}=214.2$ 13.3%	0.391 0.414
			11.0%	15.0%	10.7%				
	HDL (continuous) (discrete)	Low	(n=948) $\bar{x}=47.13$	(n=1,240) $\bar{x}=46.80$	(n=84) $\bar{x}=47.17$	0.809 0.870	(n=134) $\bar{x}=51.13$ 0.0%	(n=2,138) $\bar{x}=46.69$ 1.0%	<0.001 0.238
			0.8%	1.1%	1.2%				
	Cholesterol-HDL Ratio (continuous) (discrete)	High	(n=948) $\bar{x}=4.80$	(n=1,240) $\bar{x}=4.99$	(n=84) $\bar{x}=4.84$	0.009 0.289	(n=134) $\bar{x}=4.51$ 34.3%	(n=2,138) $\bar{x}=4.93$ 43.2%	0.001 0.045

TABLE J-1. (continued)

Dependent Variable-Covariate Associations for the Gastrointestinal Assessment

Dependent Variable	Level	Age				Race		
		Born ≥1942	Born 1923–1941	Born ≤1922	p-Value	Black	Nonblack	p-Value
Triglycerides (continuous) ^a (discrete)	High	(n=948) 5.1%	(n=1,240) $r=0.055$	(n=84) 6.8%	0.009 0.220	(n=134) $\bar{x}=96.1$	(n=2,138) $\bar{x}=119.3$	<0.001 0.170
Creatine Kinase (continuous) ^a (discrete)	High	(n=948) 7.2%	(n=1,240) $r=-0.074$	(n=84) 6.5%	<0.001 0.801	(n=134) $\bar{x}=197.5$	(n=2,138) $\bar{x}=105.4$	<0.001 <0.001
Fasting Glucose (continuous) ^a (discrete)	High	(n=948) 5.3%	(n=1,240) $r=0.195$	(n=84) 17.4%	<0.001 <0.001	(n=134) $\bar{x}=101.6$	(n=2,138) $\bar{x}=100.2$	0.322 0.143

TABLE J-1. (continued)

**Dependent Variable-Covariate Associations
for Gastrointestinal Assessment**

Dependent Variable	Level	Occupation			p-Value
		Officer	Enlisted Flyer	Enlisted Groundcrew	
Hepatomegaly	Abnormal	(n=867) 1.2%	(n=381) 0.3%	(n=1,031) 1.5%	0.173
AST (continuous)* (discrete)	High	(n=863) $\bar{x}=25.9$ 4.9%	(n=380) $\bar{x}=25.2$ 3.9%	(n=1,029) $\bar{x}=25.7$ 4.4%	0.395 0.749
ALT (continuous)* (discrete)	High	(n=863) $\bar{x}=20.4$ 11.8%	(n=380) $\bar{x}=20.4$ 9.7%	(n=1,029) $\bar{x}=20.9$ 12.1%	0.427 0.444
GGT (continuous)* (discrete)	High	(n=863) $\bar{x}=31.9$ 7.8%	(n=380) $\bar{x}=34.6$ 11.1%	(n=1,029) $\bar{x}=33.1$ 7.6%	0.152 0.089
Alkaline Phosphatase (continuous)* (discrete)	High	(n=863) $\bar{x}=87.6$ 3.5%	(n=380) $\bar{x}=95.6$ 5.5%	(n=1,029) $\bar{x}=93.9$ 5.7%	<0.001 0.059

TABLE J-1. (continued)
Dependent Variable-Covariate Associations
for Gastrointestinal Assessment

Dependent Variable	Level	Occupation			p-Value
		Officer	Enlisted Flyer	Enlisted Groundcrew	
Total Bilirubin (continuous) ^b (discrete)	High	(n=863) $\bar{x}=0.80$ 3.4%	(n=380) $\bar{x}=0.77$ 3.7%	(n=1,029) $\bar{x}=0.77$ 3.2%	0.035 0.906
Direct Bilirubin (continuous) ^b (discrete)	High	(n=863) $\bar{x}=0.17$ 4.2%	(n=380) $\bar{x}=0.15$ 6.1%	(n=1,029) $\bar{x}=0.16$ 3.2%	0.022 0.054
LDH (continuous) ^a (discrete)	High	(n=863) $\bar{x}=127.9$ 1.6%	(n=380) $\bar{x}=127.0$ 1.3%	(n=1,029) $\bar{x}=128.2$ 0.9%	0.662 0.336
Cholesterol (continuous) ^a (discrete)	High	(n=863) $\bar{x}=212.8$ 12.1%	(n=380) $\bar{x}=219.5$ 17.4%	(n=1,029) $\bar{x}=213.0$ 12.5%	0.012 0.028
HDL (continuous) (discrete)	Low	(n=863) $\bar{x}=48.23$ 0.7%	(n=380) $\bar{x}=46.13$ 1.6%	(n=1,029) $\bar{x}=46.18$ 1.0%	<0.001 0.342
Cholesterol-HDL Ratio (continuous) (discrete)	High	(n=863) $\bar{x}=4.73$ 38.5%	(n=380) $\bar{x}=5.13$ 48.4%	(n=1,029) $\bar{x}=4.96$ 44.0%	<0.001 0.002

TABLE J-1. (continued)
Dependent Variable-Covariate Associations
for Gastrointestinal Assessment

Dependent Variable	Level	Occupation			p-Value
		Officer	Enlisted Flyer	Enlisted Groundcrew	
Triglycerides (continuous) ^a (discrete)	High	(n=863) $\bar{x}=111.7$	(n=380) $\bar{x}=126.5$	(n=1,029) $\bar{x}=119.9$	0.003
		5.8%	6.3%	6.0%	0.936
Creatine Kinase (continuous) ^a (discrete)	High	(n=863) $\bar{x}=108.5$	(n=380) $\bar{x}=106.4$	(n=1,029) $\bar{x}=111.2$	0.295
		6.3%	7.1%	7.1%	0.742
Fasting Glucose (continuous) ^a (discrete)	High	(n=863) $\bar{x}=100.9$	(n=380) $\bar{x}=100.8$	(n=1,029) $\bar{x}=99.6$	0.156
		13.3%	14.2%	11.5%	0.287

TABLE J-1. (continued)
Dependent Variable-Covariate Associations for the Gastrointestinal Assessment

Dependent Variable	Level	Current Alcohol Use				Lifetime Alcohol History			
		0-1	>1-4	>4	p-Value	0	>0-40	>40	p-Value
Hepatomegaly	Abnormal	(n=1,804) 0.9%	(n=395) 1.8%	(n=74) 4.1%	0.019	(n=205) 2.0%	(n=1,548) 0.7%	(n=573) 2.1%	0.016
AST (continuous)* (discrete)	High	(n=1,799) r=0.220	(n=394) r=0.125	(n=73) 19.2%	<0.001 <0.001	(n=205) 3.9%	(n=1,543) r=0.096	(n=511) 8.4%	<0.001 <0.001
ALT (continuous)* (discrete)	High	(n=1,799) r=0.271	(n=394) r=0.125	(n=73) 19.2%	<0.001 <0.001	(n=205) 14.2%	(n=1,543) r=0.011	(n=511) 15.5%	0.591 0.007
GGT (continuous)* (discrete)	High	(n=1,799) r=0.271	(n=394) r=0.125	(n=73) 28.8%	<0.001 <0.001	(n=205) 7.8%	(n=1,543) r=0.110	(n=511) 14.9%	<0.001 <0.001
Alkaline Phosphatase* (continuous)* (discrete)	High	(n=1,314) r=-0.048	(n=950) r=-0.048	--	0.023 0.006	(n=1,145) 6.3%	(n=1,022) 3.5%	(n=96) 2.1%	<0.001 0.005
Total Bilirubin (continuous)* (discrete)	High	(n=1,799) r=0.035	(n=394) r=0.040	(n=73) 1.4%	0.092 0.566	(n=205) 2.9%	(n=1,543) 3.5%	(n=511) 3.1%	0.777 0.864
Direct Bilirubin (continuous)* (discrete)	High	(n=1,799) r=0.040	(n=394) r=0.040	(n=73) 2.7%	0.059 0.074	(n=205) 2.4%	(n=1,543) 3.9%	(n=511) 5.3%	0.501 0.178

TABLE J-1. (continued)

Dependent Variable-Covariate Associations for the Gastrointestinal Assessment

Dependent Variable	Level	Current Alcohol Use				Lifetime Alcohol History			
		0-1	>1-4	>4	p-Value	0	>0-40	>40	p-Value
LDH (continuous) ^a (discrete)	High	(n=1,799)	(n=394) r=0.016	(n=73)	0.443	(n=205)	(n=1,543) r=0.013	(n=511)	0.539
		1.1%	1.5%	4.1%	0.058	0.5%	1.0%	2.4%	0.031
Cholesterol (continuous) ^a (discrete)	High	(n=1,799)	(n=394) r=0.048	(n=73)	0.023	(n=205)	(n=1,543) r=0.013	(n=511)	0.550
		12.7%	13.7%	21.9%	0.068	12.2%	13.3%	13.1%	0.910
HDL (continuous) (discrete)	Low	(n=1,799)	(n=394) $\bar{x}=45.50$	(n=73) $\bar{x}=51.35$	<0.001	(n=205) $\bar{x}=43.85$	(n=1,543) $\bar{x}=46.62$	(n=511) $\bar{x}=49.14$	<0.001
		1.1%	0.5%	1.4%	0.567	1.0%	0.9%	1.0%	0.987
Cholesterol-HDL Ratio (continuous) (discrete)	High	(n=1,799)	(n=394) $\bar{x}=5.00$	(n=73) $\bar{x}=4.60$	<0.001	(n=205) $\bar{x}=5.13$	(n=1,543) $\bar{x}=4.93$	(n=511) $\bar{x}=4.75$	0.003
		45.4%	35.0%	16.4%	<0.001	46.3%	43.4%	38.9%	0.112
Triglycerides (continuous) ^a (discrete)	High	(n=1,799)	(n=394) r=0.002	(n=73)	0.936	(n=205)	(n=1,543) r=0.026	(n=511)	0.224
		5.7%	6.9%	6.9%	0.657	5.4%	5.4%	7.6%	0.181
Creatine Kinase (continuous) ^a (discrete)	High	(n=1,799)	(n=394) r=-0.014	(n=73)	0.499	(n=205)	(n=1,543) r=-0.040	(n=511)	0.055
		7.0%	5.8%	5.5%	0.640	5.4%	7.5%	5.3%	0.168
Fasting Glucose (continuous) ^a (discrete)	High	(n=1,799)	(n=394) r=0.032	(n=73)	0.125	(n=205)	(n=1,543) r=0.067	(n=511)	0.002
		12.1%	15.0%	15.1%	0.238	13.2%	9.9%	20.7%	<0.001

TABLE J-1. (continued)

Dependent Variable-Covariate Associations for the Gastrointestinal Assessment

Dependent Variable	Level	Industrial Chemical Exposure			Degreasing Chemical Exposure		
		Yes	No	p-Value	Yes	No	p-Value
Hepatomegaly	Abnormal	(n=1,252) 1.0%	(n=1,027) 1.4%	0.478	(n=1,371) 1.1%	(n=908) 1.2%	0.944
AST (continuous)* (discrete)	High	(n=1,250) $\bar{x}=25.5$ 4.3%	(n=1,022) $\bar{x}=25.9$ 4.7%	0.224 0.740	(n=1,368) $\bar{x}=25.8$ 5.1%	(n=904) $\bar{x}=25.5$ 3.5%	0.443 0.091
ALT (continuous)* (discrete)	High	(n=1,250) $\bar{x}=20.6$ 11.4%	(n=1,022) $\bar{x}=20.7$ 11.8%	0.781 0.818	(n=1,368) $\bar{x}=21.0$ 11.9%	(n=904) $\bar{x}=20.1$ 11.2%	0.032 0.638
GGT (continuous)* (discrete)	High	(n=1,250) $\bar{x}=32.5$ 8.1%	(n=1,022) $\bar{x}=33.2$ 8.4%	0.414 0.830	(n=1,368) $\bar{x}=33.6$ 8.6%	(n=904) $\bar{x}=31.9$ 7.7%	0.068 0.544
Alkaline Phosphatase (continuous)* (discrete)	High	(n=1,250) $\bar{x}=93.1$ 5.9%	(n=1,022) $\bar{x}=90.1$ 3.5%	0.001 0.010	(n=1,368) $\bar{x}=92.5$ 5.5%	(n=904) $\bar{x}=90.6$ 3.9%	0.050 0.096

TABLE J-1. (continued)

Dependent Variable-Covariate Associations for the Gastrointestinal Assessment

Dependent Variable	Level	Industrial Chemical Exposure			Degreasing Chemical Exposure		
		Yes	No	p-Value	Yes	No	p-Value
Total Bilirubin (continuous) ^b (discrete)	High	(n=1,250) $\bar{x}=0.78$ 4.0%	(n=1,022) $\bar{x}=0.78$ 2.5%	0.757 0.069	(n=1,368) $\bar{x}=0.78$ 3.2%	(n=904) $\bar{x}=0.79$ 3.5%	0.374 0.758
Direct Bilirubin (continuous) ^b (discrete)	High	(n=1,250) $\bar{x}=0.16$ 4.6%	(n=1,022) $\bar{x}=0.16$ 3.3%	0.483 0.139	(n=1,368) $\bar{x}=0.16$ 4.2%	(n=904) $\bar{x}=0.16$ 3.9%	0.230 0.816
LDH (continuous) ^a (discrete)	High	(n=1,250) $\bar{x}=128.2$ 1.2%	(n=1,022) $\bar{x}=127.5$ 1.3%	0.434 0.999	(n=1,368) $\bar{x}=128.3$ 1.3%	(n=904) $\bar{x}=127.4$ 1.1%	0.330 0.814
Cholesterol (continuous) ^a (discrete)	High	(n=1,250) $\bar{x}=215.6$ 14.2%	(n=1,022) $\bar{x}=212.0$ 11.8%	0.030 0.104	(n=1,368) $\bar{x}=214.4$ 13.7%	(n=904) $\bar{x}=213.5$ 12.3%	0.586 0.344
HDL (continuous) (discrete)	Low	(n=1,250) $\bar{x}=46.45$ 1.3%	(n=1,022) $\bar{x}=47.56$ 0.6%	0.029 0.093	(n=1,368) $\bar{x}=46.14$ 1.3%	(n=904) $\bar{x}=48.18$ 0.4%	<0.001 0.037
Cholesterol-HDL Ratio (continuous) (discrete)	High	(n=1,250) $\bar{x}=4.99$ 44.2%	(n=1,022) $\bar{x}=4.80$ 40.7%	0.002 0.090	(n=1,368) $\bar{x}=5.00$ 44.9%	(n=904) $\bar{x}=4.76$ 39.3%	<0.001 0.008

TABLE J-1. (continued)

Dependent Variable-Covariate Associations for the Gastrointestinal Assessment

Dependent Variable	Level	Industrial Chemical Exposure			Decreasing Chemical Exposure		
		Yes	No	p-Value	Yes	No	p-Value
Triglycerides (continuous) ^a (discrete)	High	(n=1,250) x̄=121.0 6.3%	(n=1,022) x̄=114.0 5.6%	0.027 0.514	(n=1,368) x̄=122.7 6.2%	(n=904) x̄=110.7 5.6%	<0.001 0.640
Creatine Kinase (continuous) ^a (discrete)	High	(n=1,250) x̄=108.6 6.4%	(n=1,022) x̄=110.3 7.2%	0.465 0.478	(n=1,368) x̄=108.6 6/9%	(n=904) x̄=110.6 6.6%	0.410 0.898
Fasting Glucose (continuous) ^a (discrete)	High	(n=1,250) x̄=100.5 12.2%	(n=1,022) x̄=100.0 13.1%	0.503 0.576	(n=1,368) x̄=100.3 13.2%	(n=904) x̄=100.3 11.8%	0.964 0.388

^aTransformed from natural logarithm scale.

^bTransformed from natural logarithm (X + 0.1) scale.

*Associations between alkaline phosphatase and alcohol variables are based on current wine use and lifetime wine history, instead of current alcohol use and lifetime alcohol history, respectively. The cutpoints for current wine use and history are given in Table 13-1.

Note: Correlations (r) are based on total sample size and are not category specific.

TABLE J-2.
Associations Between Occurrence of Ulcer and Blood Type

Dependent Variable	Level	Blood				p-Value
		0	A	B	AB	
Reported Ulcer	(n=1,033)	(n=913)	(n=257)	(n=76)		
	Yes-Current	1.1%	1.0%	0.4%	0.0%	0.740
	Yes-Past	1.0%	0.9%	1.6%	0.0%	
	No	98.0%	98.1%	98.1%	100.0%	
Verified Ulcer (Questionnaire and Physical Exam)	(n=1,033)	(n=914)	(n=257)	(n=76)		
	Yes	5.0%	4.2%	4.3%	2.6%	0.665

TABLE J-3.
Summary of Group-by-Covariate Interactions for Hepatic Variables

Variable	Interaction	Stratification	Statistic	Group		Adj. Relative Risk (95% C.I.)	p-Value
				Ranch Hand	Comparison		
J-13	Diagnosed Hepatomegaly	Group-by-Degreasing Chemical Exposure	No	n Number/%	394	509	
			Abnormal	2	0.5%	9	0.27 (0.06,1.26)
		Normal		392	99.5%	500	0.095
		Yes	n Number/%	584	779		
		Abnormal		9	1.5%	6	2.04 (0.72,5.81)
		Normal		575	98.5%	773	0.181
ALT	Group-by-Lifetime Alcohol History	0 Drink-Years	n Adj. Mean ^a 95% C.I. ^a	97 21.3 (19.2,23.7)	108 23.0 (20.8,25.4)	--	0.269
		>0-40 Drink-Years	n Adj. Mean ^a 95% C.I. ^a	669 20.3 (19.3,21.5)	874 20.6 (19.6,21.7)	--	0.644
		>40 Drink-Years	n Adj. Mean ^a 95% C.I. ^a	210 21.8 (20.1,23.6)	301 20.3 (18.8,21.8)	--	0.095

TABLE J-3. (continued)
Summary of Group-by-Covariate Interactions for Hepatic Variables

Variable	Interaction	Stratification	Statistic	Group				Adj. Relative Risk (95% C.I.)	p-Value
				Ranch	Hand	Comparison			
Total Bilirubin	Group-by-Current Alcohol Use	0 Drinks/Day	n	97		108			
		0 Drink-Years	Number/%						
	Group-by-Lifetime Alcohol History	Abnormal	3	3.1%		3	2.8%	1.12 (0.22,5.67)	0.999
		Normal	94	96.9%		105	97.2%		
	<1 Drinks/Day >0-40 Drink-Years	n	587		786				
		Number/%							
	<1 Drinks/Day >40 Drink-Years	Abnormal	19	3.2%		30	3.8%	0.84 (0.47,1.51)	0.674
		Normal	568	96.8%		756	96.2%		
	>1-4 Drinks/Day >0-40 Drink-Years	n	97		120				
		Number/%							
	>1-4 Drinks/Day >40 Drink-Years	Abnormal	1	1.0%		4	3.3%	0.30 (0.03,2.75)	0.516
		Normal	96	99.0%		116	96.7%		
	>4 Drinks/Day >40 Drink-Years*	n	82		85				
		Number/%							
	>4 Drinks/Day >40 Drink-Years*	Abnormal	2	2.4%		3	3.5%	0.68 (0.11,4.20)	0.999
		Normal	80	97.6%		82	96.5%		
	>4 Drinks/Day >40 Drink-Years*	n	86		139				
		Number/%							
	>4 Drinks/Day >40 Drink-Years*	Abnormal	2	2.3%		8	5.8%	0.39 (0.08,1.88)	0.384
		Normal	84	97.7%		131	94.2%		
	>4 Drinks/Day >40 Drink-Years*	n	27		45				
		Number/%							
	>4 Drinks/Day >40 Drink-Years*	Abnormal	1	3.6%		0	0.0%	--	0.750
		Normal	26	96.4%		45	100.0%		

TABLE J-3. (continued)
Summary of Group-by-Covariate Interactions for Hepatic Variables

Variable	Interaction	Stratification	Statistic	Group		Adj. Relative Risk (95% C.I.)	p-Value		
				Ranch Hand	Comparison				
Direct Bilirubin	Group-by-Race	Black	n	55	79	--	0.026		
			Adj. Mean ^b	0.181	0.134				
	Group-by-Degreasing Chemical Exposure	Nonblack	95% C.I. ^b	(0.148,0.218)	(0.112,0.160)	--	0.565		
			n	931	1,207				
Direct Bilirubin	Group-by-Degreasing Chemical Exposure	No	Adj. Mean ^b	0.155	0.158	1.59 (0.81,3.14)	0.180		
			95% C.I. ^b	(0.147,0.163)	(0.151,0.165)				
			n	395	509				
			Number/%						
	Group-by-Degreasing Chemical Exposure	Yes	Abnormal	19	4.8%	16	3.1%		
			Normal	376	95.2%	493	96.9%		
			n	591	777	0.48 (0.27,0.87)	0.016		
			Number/%						
SII			Abnormal	16	2.7%	41	5.3%		
			Normal	575	97.3%	736	94.7%		

TABLE J-3. (continued)
Summary of Group-by-Covariate Interactions for Hepatic Variables

Variable	Interaction	Stratification	Statistic	Group		Adj. Relative Risk (95% C.I.)	p-Value
				Ranch Hand	Comparison		
HDL	Group-by Lifetime Alcohol History	0 Drink-Years	n	97	108	--	0.827
			Adj. Mean	47.23	47.58		
			95% C.I.	(44.67,49.78)	(45.14,50.02)		
	>0-40 Drink-Years		n	669	874	--	0.205
			Adj. Mean	49.60	48.84		
			95% C.I.	(48.28,50.93)	(47.60,50.08)		
	>40 Drink-Years		n	210	301	--	0.067
			Adj. Mean	47.41	49.33		
			95% C.I.	(45.47,49.35)	(47.56,51.09)		

^aTransformed from natural logarithm scale.

--Adjusted relative risk not applicable for continuous analysis of a variable; adjusted relative risk/confidence interval not given due to cell with a zero frequency.

*Includes two Comparisons with 25 and 28 drink-years; all others are >40 drink-years.

^bTransformed from natural logarithm ($X + 0.1$) scale.

Note: Refer to Tables 13-5 and 13-7 for specification of adjusted model.

TABLE J-4.
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
AST	Exposure Index-by- Current Alcohol Use (Officer)	0-1	n	99	91	95	M vs. L H vs. L	— —	0.825 0.555
			Adj. Mean ^a	24.3	24.0	23.7		M vs. L H vs. L	— —
			95% C.I. ^a	(21.3,27.8)	(21.1,27.4)	(20.8,27.0)			
	>1-4		n	24	31	25	M vs. L H vs. L	— —	0.245 0.006
			Adj. Mean ^a	25.9	28.5	33.0		M vs. L H vs. L	— —
			95% C.I. ^a	(22.0,30.6)	(24.6,33.1)	(28.1,38.8)			
	>4		n	4	0	2	M vs. L H vs. L	— —	— 0.240
			Adj. Mean ^a	21.0	—	28.6		M vs. L H vs. L	— —
			95% C.I. ^a	(15.1,29.0)	—	(18.4,44.5)			
ALT	Exposure Index-by- Age (Enlisted Flyer)	Born >1942	n	11	17	11	Overall M vs. L H vs. L	— — —	0.271 — 0.999
			Number/%					M vs. L H vs. L	— —
			Abnormal	0	0.0%	0			
	Born 1923- 1941		Normal	11	100.0%	17	9.1% 90.9% M vs. L H vs. L	2.05 (0.18,23.48) — —	0.366 0.999 0.999
			n	43	43	42		M vs. L H vs. L	— —
			Number/%						
	Born <1922		Abnormal	1	2.3%	2	0.0% 100.0% M vs. L H vs. L	— — —	— — —
			Normal	42	97.7%	41		M vs. L H vs. L	— —
			n	0	2	0			
			Number/%						
			Abnormal	0	—	0			
			Normal	0	—	2			

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value	
				Low	Medium	High				
ALT	Exposure Index-by- Current Alcohol Use (Officer)	0-1	n	99	91	95	M vs. L H vs. L	— —	0.674 0.469	
			Adj. Mean ^a	17.3	16.8	16.4				
			95% C.I. ^a	(13.9,21.4)	(13.5,20.8)	(13.3,20.3)				
	>1-4		n	24	31	25	M vs. L H vs. L	— —	0.100 0.001	
			Adj. Mean ^a	17.0	21.3	26.9				
			95% C.I. ^a	(13.1,22.2)	(16.7,27.2)	(20.7,35.0)				
	>4		n	4	0	2	M vs. L H vs. L	— —	— 0.404	
			Adj. Mean ^a	14.6	—	20.9				
			95% C.I. ^a	(8.6,24.7)	—	(10.2,42.8)				
AST	Exposure Index-by- Lifetime Alcohol History (Officer)	0	n	10	3	13	Overall		0.100	
			Number/%							
			Abnormal	4	40.0%	0	0.0%	1		
	>0-40		Normal	6	60.0%	3	100.0%	12	0.588 0.177	
			n	96	92	78	Overall			
			Number/%							
	>40		Abnormal	9	9.4%	12	13.0%	8	1.45 (0.58,3.62) 1.11 (0.41,3.01)	
			Normal	87	90.6%	80	87.0%	70		
			n	21	27	31	Overall			
ALB	Exposure Index-by- Lifetime Alcohol History (Officer)		Number/%						0.705	
			Abnormal	9	9.4%	12	13.0%	8		
			Normal	87	90.6%	80	87.0%	70		
	>0-40		n	96	92	78			0.572 0.999	
			Number/%							
			Abnormal	9	9.4%	12	13.0%	8		
	>40		Normal	87	90.6%	80	87.0%	70		
			n	21	27	31	Overall		0.221	
			Number/%							
GLOB	Exposure Index-by- Lifetime Alcohol History (Officer)		Abnormal	1	25.0%	5	18.5%	7	4.55 (0.49,42.31) 5.83 (0.66,51.49)	
			Normal	20	75.0%	22	81.5%	24		
			n	21	27	31	Overall			
	>0-40		Number/%						0.324 0.168	
			Abnormal	1	25.0%	5	18.5%	7		
			Normal	20	75.0%	22	81.5%	24		
	>40		n	21	27	31	Overall		— —	
			Number/%							
			Abnormal	1	25.0%	5	18.5%	7		
GPT	Exposure Index-by- Lifetime Alcohol History (Officer)		Normal	20	75.0%	22	81.5%	24	— —	
			n	21	27	31	Overall			
			Number/%							
	>0-40		Abnormal	1	25.0%	5	18.5%	7	— —	
			Normal	20	75.0%	22	81.5%	24		
			n	21	27	31	Overall			
	>40		Number/%						— —	
			Abnormal	1	25.0%	5	18.5%	7		
			Normal	20	75.0%	22	81.5%	24		

TABLE J-4. (continued)

Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
ALT	Exposure Index-by- Age	Born >1942	n Number/%	1	1	0	Overall	—	—
		0-1	Abnormal	0 0.0%	0 0.0%	0 —	M vs. L	—	—
		0	Normal	1 100.0%	1 100.0%	0 —	H vs. L	—	—
	Exposure Index-by- Current Alcohol Use	Yes	n Number/%	0	1	1	Overall	—	0.157
		Born >1942	Abnormal	0 —	0 0.0%	1 100.0%	M vs. L	—	—
		0-1	Normal	0 —	1 100.0%	0 0.0%	H vs. L	—	—
	Exposure Index-by- Lifetime Alcohol History	No	n Number/%	6	7	3	Overall	—	0.411
		Born >1942	Abnormal	1 16.7%	0 0.0%	0 0.0%	M vs. L	—	0.261
		0-1	Normal	5 83.3%	7 100.0%	3 100.0%	H vs. L	—	0.999
	Exposure Index-by- Degreasing Chemical Exposure (Enlisted Flyer)	Yes	n Number/%	0	1	5	Overall	—	0.624
AST		Born >1942	Abnormal	0 —	0 0.0%	1 20.0%	M vs. L	—	—
		0-1	Normal	0 —	1 100.0%	4 80.0%	H vs. L	—	—
		0	n Number/%	3	5	2	Overall	—	0.392
		0-1	Abnormal	0 0.0%	1 20.0%	1 50.0%	M vs. L	—	0.999
		>0	Normal	3 100.0%	4 80.0%	1 50.0%	H vs. L	—	0.800

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
ALT (cont.)	Born >1942	n	1	1	0	0	Overall	—	0.157
		Number/%							
		0-1	Abnormal	1 100.0%	0 0.0%	0 —	M vs. L		0.157
		>40	Normal	0 0.0%	1 100.0%	0 —	H vs. L		—
		No							
	Born >1942	n	0	1	0	0	Overall	—	—
		Number/%							
		≤4	Abnormal	0 —	0 0.0%	0 —	M vs. L		—
		>40	Normal	0 —	1 100.0%	0 —	H vs. L		—
		Yes							
	Born 1923- 1941	n	4	2	6	6	Overall	—	0.065
		Number/%							
		0-1	Abnormal	0 0.0%	1 50.0%	0 0.0%	M vs. L		0.666
		0	Normal	4 100.0%	1 50.0%	6 100.0%	H vs. L		—
		Yes							
	Born 1923- 1941	n	1	2	0	0	Overall	—	—
		Number/%							
		0-1	Abnormal	0 0.0%	0 0.0%	0 —	M vs. L		—
		0	Normal	1 100.0%	2 100.0%	0 —	H vs. L		—
		No							

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
ALT (cont.)	Born 1923- 1941 0-1 ≥40 Yes	Born	n	21	17	17	Overall		0.029
		Number/%							
		Abnormal	0	0.0%	3	17.6%	0	0.0% M vs. L	—
		Normal	21	100.0%	14	82.4%	17	100.0% H vs. L	—
	Born 1923- 1941 0-1 ≥40 No	Born	n	4	6	4	Overall		—
		Number/%							
		Abnormal	0	0.0%	0	0.0%	0	0.0% M vs. L	—
		Normal	4	100.0%	6	100.0%	4	100.0% H vs. L	—
	Born 1923- 1941 0-1 ≥40 Yes	Born	n	3	5	4	Overall		0.336
		Number/%							
		Abnormal	0	0.0%	0	0.0%	1	25.0% M vs. L	—
		Normal	3	100.0%	5	100.0%	3	75.0% H vs. L	—
	Born 1923- 1941 0-1 ≥40 No	Born	n	3	1	0	Overall		—
		Number/%							
		Abnormal	0	0.0%	0	0.0%	0	— M vs. L	—
		Normal	3	100.0%	1	100.0%	0	— H vs. L	—

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
ALT (cont.)	Born 1923-	n	1	0	6	Overall	M vs. L H vs. L	— —	— —
	1941	Number/%	0 0.0%	0 —	0 0.0%				
	>1-4	Abnormal	1 100.0%	0 —	6 100.0%				
	>0-40	Normal							
	Yes								
	Born 1923-	n	2	2	0	Overall	M vs. L H vs. L	— —	— —
	1941	Number/%	0 0.0%	0 0.0%	0 —				
	>1-4	Abnormal	2 100.0%	2 100.0%	0 —				
	>0-40	Normal							
	No								
J-22	Born 1923-	n	2	6	1	Overall	M vs. L H vs. L	0.20 (0.006,6.66)	0.223 0.928 0.999
	1941	Number/%	1 50.0%	1 16.7%	1 100.0%				
	>1-4	Abnormal	1 50.0%	5 83.3%	0 0.0%				
	>0-40	Normal							
	Yes								
	Born 1923-	n	0	0	1	Overall	M vs. L H vs. L	— —	— —
	1941	Number/%	0 —	0 —	0 0.0%				
	>1-4	Abnormal	0 —	0 —	1 100.0%				
	>0-40	Normal							
	No								

TABLE J-4. (continued)

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
GGT	Exposure Index-by- Degreasing Chemical Exposure	Yes	n	38	36	50	M vs. L	—	0.147
			Adj. Mean ^a	38.7	31.0	33.8			
	(Officer)	No	95% C.I. ^a	(27.9,53.7)	(22.3,43.0)	(24.9,46.0)	H vs. L	—	0.341
			n	89	86	72	M vs. L	—	0.214
			Adj. Mean ^a	24.5	27.8	32.6			
			95% C.I. ^a	(18.5,32.5)	(21.1,36.6)	(24.5,43.4)	H vs. L	—	0.007

TABLE J-4. (continued)

Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
GGT	Exposure Index-by- Lifetime Alcohol History	0 Drink-Years 0-1 Drinks/ Day	n Number/%	6	6	7	Overall		0.991
			Abnormal	1	16.7%	1	M vs. L	1.00 (0.05,20.83)	0.999
			Normal	5	83.3%	5	H vs. L	0.83 (0.04,16.99)	0.999
		>0-40 Drink-Years 0-1 Drinks/ Day	n Number/%	31	32	29	Overall		0.132
			Abnormal	1	3.2%	0	M vs. L	—	0.984
			Normal	30	96.8%	32	H vs. L	3.46 (0.34,35.34)	0.562
	Exposure Index-by- Current Alcohol Use (Enlisted Flyer)	>40 Drink-Years 0-1 Drinks/ Day	n Number/%	10	12	6	Overall		0.149
			Abnormal	0	0.0%	0	M vs. L	—	—
			Normal	10	100.0%	12	H vs. L	—	0.750
ALT	>0-40 Drink-Years >1-4 Drinks/ Day	>0-40 Drink-Years >1-4 Drinks/ Day	n Number/%	3	2	6	Overall		0.206
			Abnormal	1	33.3%	1	M vs. L	2.00 (0.05,78.25)	0.999
			Normal	2	66.7%	1	H vs. L	—	0.666
		>40 Drink-Years >1-4 Drinks/ Day	n Number/%	2	7	2	Overall		0.441
			Abnormal	1	50.0%	1	M vs. L	0.17 (0.005,5.45)	0.834
			Normal	1	50.0%	6	H vs. L	1.00 (0.02,50.40)	0.999
	>40 Drink-Years >4 Drinks/ Day	>40 Drink-Years >4 Drinks/ Day	n Number/%	2	3	3	Overall		0.076
			Abnormal	2	100.0%	1	M vs. L	—	0.600
			Normal	0	0.0%	2	H vs. L	—	0.200

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value	
				Low	Medium	High				
Alkaline Phosphatase	Exposure Index-by-Lifetime Vine History (Officer)	0	n	35	34	35	M vs. L H vs. L	— —	0.659 0.398	
			Adj. Mean ^a	83.4	85.5	79.4		— —		
			95% C.I. ^a	(73.8, 94.2)	(75.9, 96.4)	(70.6, 89.3)				
	>0-10		n	83	80	76	M vs. L H vs. L	— —	0.729 0.108	
			Adj. Mean ^a	78.2	77.2	83.3		— —		
			95% C.I. ^a	(70.5, 86.8)	(69.7, 85.6)	(75.0, 92.5)				
	>10		n	9	8	11	M vs. L H vs. L	— —	0.133 0.017	
			Adj. Mean ^a	61.3	73.3	79.9		— —		
			95% C.I. ^a	(50.2, 74.9)	(58.4, 91.9)	(67.2, 95.0)				
J-26	Exposure Index-by-Degreasing Chemical Exposure	Yes	n	105	114	110	M vs. L H vs. L	— —	0.028 0.377	
			Adj. Mean ^a	93.5	100.1	96.2				
	(Enlisted Groundcrew)	No	n	39	41	28	M vs. L H vs. L	— —	0.399 0.217	
			Adj. Mean ^a	97.1	93.0	104.2				
			95% C.I. ^a	(90.0, 104.8)	(86.0, 100.6)	(95.1, 114.1)				

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index						Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low		Medium		High				
Alkaline Phosphatase	Exposure Index-by- Lifetime Wine History (Enlisted Groundcrew)	0	n Number/%	90		112		101		Overall		0.278
			Abnormal	3	3.3%	10	8.9%	7	6.9%	M vs. L	2.84 (0.76,10.67)	0.180
			Normal	87	96.7%	102	91.1%	94	93.1%	H vs. L	2.16 (0.54,8.62)	0.434
	>0-10		n Number/%	49		39		35		Overall		0.067
			Abnormal	6	12.2%	0	0.0%	2	5.7%	M vs. L	—	0.052
			Normal	43	87.8%	39	100.0%	33	94.3%	H vs. L	0.43 (0.08,2.29)	0.540
	>10		n Number/%	5		4		2		Overall		—
			Abnormal	0	0.0%	0	0.0%	0	0.0%	M vs. L	—	—
			Normal	5	100.0%	4	100.0%	2	100.0%	H vs. L	—	—

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Total Bilirubin	Exposure Index-by-Age	Born >1942	n Number/%	16	6	2	Overall	—	—
		Yes	Abnormal Normal	0 16	0.0% 100.0%	0 6	0.0% 100.0%	0 2	0.0% 100.0% M vs. L H vs. L
	Exposure Index-by-Industrial Chemical Exposure (Officer)	Born >1942	n Number/%	30	14	9	Overall	—	0.296
		No	Abnormal Normal	3 27	10.0% 90.0%	0 14	0.0% 100.0%	0 9	0.0% 100.0% M vs. L H vs. L
	Born 1923-1941	Born 1923-	n Number/%	26	29	42	Overall	—	0.478
		1941	Abnormal Normal	1 25	3.8% 96.2%	2 27	6.9% 93.1%	5 37	11.9% 88.1% M vs. L H vs. L
		Yes	—	—	—	—	—	1.85 (0.16,21.70) 3.38 (0.37,30.68)	0.999 0.500
	Born <1922	Born 1923-	n Number/%	50	59	66	Overall	—	0.284
		1941	Abnormal Normal	1 49	2.0% 98.0%	0 59	0.0% 100.0%	0 66	0.0% 100.0% M vs. L H vs. L
		No	—	—	—	—	—	—	0.918 0.862
	Born <1922	Born <1922	n Number/%	1	6	0	Overall	—	—
		Yes	Abnormal Normal	0 1	0.0% 100.0%	0 6	0.0% 100.0%	0 0	— — M vs. L H vs. L
	Born <1922	No	n Number/%	4	8	3	Overall	—	0.626
		—	Abnormal Normal	0 4	0.0% 100.0%	1 7	12.5% 87.5%	0 3	0.0% 100.0% M vs. L H vs. L

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Total Bilirubin	Exposure Index-by-Age	Born >1942	n	9	10	4	Overall		0.241
		Yes (IC)	Number/%	0 0.0%	2 20.0%	0 0.0%	M vs. L	—	0.156
		Yes (DC)	Abnormal	9 100.0%	8 80.0%	4 100.0%	H vs. L	—	—
	Exposure Index-by-Industrial Chemical Exposure	Born >1942	n	1	2	4	Overall		0.030
		Yes (IC)	Number/%	1 100.0%	0 0.0%	0 0.0%	M vs. L	—	0.666
		No (DC)	Normal	0 0.0%	2 100.0%	4 100.0%	H vs. L	—	0.400
	Exposure Index-by-Degreasing Chemical Exposure	Born >1942	n	1	4	1	Overall		—
		No (IC)	Number/%	0 0.0%	0 0.0%	0 0.0%	M vs. L	—	—
		Yes (DC)	Abnormal	1 100.0%	4 100.0%	1 100.0%	H vs. L	—	—
	Exposure Index-by-Enlisted Flyer	Born >1942	n	0	1	2	Overall		0.511
		No (IC)	Number/%	0 —	0 0.0%	0 0.0%	M vs. L	—	—
		No (DC)	Normal	0 —	1 100.0%	2 100.0%	H vs. L	—	—
ALT	Exposure Index-by-Birth Year	Born 1923-1941	n	24	23	23	Overall		0.355
		Yes (IC)	Number/%	0 0.0%	1 4.3%	0 0.0%	M vs. L	—	0.302
		Yes (DC)	Normal	24 100.0%	22 95.7%	23 100.0%	H vs. L	—	—
		Born 1923-1941	n	5	2	4	Overall		—
		Yes (IC)	Number/%	0 0.0%	0 0.0%	0 0.0%	M vs. L	—	—
		No (DC)	Abnormal	5 100.0%	2 100.0%	4 100.0%	H vs. L	—	—
	Exposure Index-by-Occupation	Non-manual	n	10	10	10	Overall		0.001
		Yes (IC)	Number/%	10 100.0%	10 100.0%	10 100.0%	M vs. L	—	—
		No (DC)	Abnormal	—	—	—	H vs. L	—	—
		Manual	n	10	10	10	Overall		0.001
		Yes (IC)	Number/%	10 100.0%	10 100.0%	10 100.0%	M vs. L	—	—

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Total Bilirubin (cont.)	Born 1923- 1941	Born	n	9	9	13	Overall		0.489
		1923-	Number/%						
		1941	Abnormal	0	0.0%	0	0.0%	1	7.7% M vs. L
		No (IC)	Normal	9	100.0%	9	100.0%	12	92.3% H vs. L
	Yes (DC)	Yes (DC)							
		Born	n	5	9	2	Overall		—
		1923-	Number/%						
		1941	Abnormal	0	0.0%	0	0.0%	0	0.0% M vs. L
	No (IC)	No (IC)	Normal	5	100.0%	9	100.0%	2	100.0% H vs. L
		No (DC)							
	<1922	Born	n	0	2	0	Overall		—
		<1922	Number/%						
		No (IC)	Abnormal	0	—	0	0.0%	0	— M vs. L
		Yes (DC)	Normal	0	—	2	100.0%	0	— H vs. L

TABLE J-4. (continued)

Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Total Bilirubin	Exposure Index-by-Age	Born >1942 0-1	n Adj. Mean ^b 95% C.I. ^b	66 0.817 (0.752,0.887)	99 0.757 (0.699,0.818)	64 0.789 (0.723,0.861)	M vs. L H vs. L	—	0.108
	Exposure Index-by-Current Alcohol Use	Born >1942 ≥1-4	n Adj. Mean ^b 95% C.I. ^b	14 0.783 (0.666,0.919)	19 0.833 (0.723,0.958)	13 0.840 (0.710,0.989)	M vs. L H vs. L	—	0.557
	(Enlisted Groundcrew)	Born >1942 ≥4	n Adj. Mean ^b 95% C.I. ^b	2 0.775 (0.502,1.171)	2 1.495 (0.996,2.222)	2 1.028 (0.678,1.535)	M vs. L H vs. L	—	0.026
		Born 1923-1941 0-1	n Adj. Mean ^b 95% C.I. ^b	47 0.681 (0.616,0.752)	28 0.807 (0.718,0.905)	44 0.787 (0.712,0.869)	M vs. L H vs. L	—	0.019
	1941 ≥1-4	Born 1923-1941 ≥1-4	n Adj. Mean ^b 95% C.I. ^b	6 0.916 (0.717,1.163)	5 0.816 (0.623,1.061)	7 0.865 (0.687,1.083)	M vs. L H vs. L	—	0.520
		Born 1923-1941 ≥4	n Adj. Mean ^b 95% C.I. ^b	4 0.766 (0.562,1.031)	1 0.821 (0.447,1.450)	2 0.645 (0.412,0.984)	M vs. L H vs. L	—	0.835

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
J-32 Total Bilirubin (cont.)	Born <1922 0-1	n	4	0	5				
		Adj. Mean ^b	0.740	—	0.907	M vs. L	—	—	0.306
		95% C.I. ^b	(0.541,1.000)	—	(0.693,1.180)	H vs. L	—	—	
	>1-4	n	0	1	1				
		Adj. Mean ^b	—	0.812	1.217	M vs. L	—	—	—
		95% C.I. ^b	—	(0.442,1.435)	(0.683,2.116)	H vs. L	—	—	
Direct Bilirubin	Exposure Index-by- Current Alcohol Use (Enlisted Groundcrew)	0-1	n	117	127	113			
		Adj. Mean ^b	0.169	0.182	0.194	M vs. L	—	0.382	
		95% C.I. ^b	(0.143,0.196)	(0.155,0.211)	(0.166,0.226)	H vs. L	—	0.106	
	>1-4	n	20	25	21				
		Adj. Mean ^b	0.159	0.206	0.224	M vs. L	—	0.191	
		95% C.I. ^b	(0.113,0.216)	(0.156,0.267)	(0.167,0.294)	H vs. L	—	0.095	
	>4	n	6	3	4				
		Adj. Mean ^b	0.124	0.330	0.159	M vs. L	—	0.031	
		95% C.I. ^b	(0.057,0.220)	(0.163,0.602)	(0.069,0.299)	H vs. L	—	0.597	

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
LDH	Exposure Index-by- Lifetime Alcohol History (Officer)	0	n	10	3	13	M vs. L	—	0.435
			Adj. Mean ^a	134.3	146.2	116.6		H vs. L	—
			95% C.I. ^a	(119.0,151.6)	(120.3,177.7)	(104.6,130.0)			
			n	96	92	78	M vs. L	—	0.300
		>40	Adj. Mean ^a	135.4	132.1	131.6		H vs. L	—
			95% C.I. ^a	(126.2,145.3)	(120.4,144.9)	(122.5,141.3)			
			n	21	27	31	M vs. L	—	0.070
			Adj. Mean ^a	125.3	137.0	140.5		H vs. L	—
			95% C.I. ^a	(113.2,138.8)	(124.9,150.2)	(129.0,153.0)			

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
LDH	Exposure Index-by- Age	Born >1942	n	0	1	0	M vs. L	—	—
		Black	Adj. Mean ^a 95% C.I. ^a	— —	115.5 (81.7,163.3)	— —	H vs. L	— —	— —
	Exposure Index-by- Race (Enlisted Flyer)	Born 1923- 1941	n	1	3	3	M vs. L	—	0.073
		Black	Adj. Mean ^a 95% C.I. ^a	77.5 (54.8,109.6)	111.9 (91.8,136.5)	126.4 (102.9,155.4)	M vs. L H vs. L	— —	0.018
		Born >1942 Nonblack	n Adj. Mean ^a 95% C.I. ^a	11 122.6 (109.8,136.8)	16 112.9 (103.3,123.4)	11 138.1 (124.4,153.4)	M vs. L H vs. L	— —	0.238 0.121
	Born 1923- 1941 Nonblack	n	42	40	39	M vs. L	—	0.118	
		Adj. Mean ^a 95% C.I. ^a	132.7 (125.4,140.4)	124.8 (117.9,132.1)	127.6 (120.1,135.6)	H vs. L	—	0.321	
	Born <1922 Nonblack	n	0	2	0	M vs. L	—	—	
		Adj. Mean ^a 95% C.I. ^a	— —	138.1 (107.8,176.9)	— —	H vs. L	— —	— —	

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
LDH	Exposure Index-by- Race	Black 0-1	n	11	8	9	Overall		0.449
			Number/%						
		Black >1-4	Abnormal	1	9.1%	0	0.0%	0	0.0%
			Normal	10	90.9%	8	100.0%	9	100.0%
	Exposure Index-by- Current Alcohol Use (Enlisted Groundcrew)	Black >4	n	2	2	3	Overall		—
			Number/%						
		Nonblack 0-1	Abnormal	0	0.0%	0	0.0%	0	0.0%
			Normal	2	100.0%	2	100.0%	3	100.0%
	Nonblack >1-4	Black >4	n	2	2	0	Overall		—
			Number/%						
		Nonblack >1-4	Abnormal	0	0.0%	0	0.0%	0	0.0%
			Normal	2	100.0%	2	100.0%	0	—
	Nonblack >4	Nonblack 0-1	n	106	119	104	Overall		0.565
			Number/%						
		Nonblack >1-4	Abnormal	1	0.9%	0	0.0%	1	1.0%
			Normal	105	99.1%	119	100.0%	103	99.0%
		Nonblack >4	n	18	23	18	Overall		—
			Number/%						
		Nonblack >4	Abnormal	0	0.0%	0	0.0%	0	0.0%
			Normal	18	100.0%	23	100.0%	18	100.0%

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Cholesterol	Exposure Index-by- Degreasing Chemical Exposure (Enlisted Flyer)	Yes	n	43	48	41	Overall		0.080
			Number/%						
		No	Abnormal	11	25.6%	8	16.7%	3	7.3% M vs. L
			Normal	32	74.4%	40	83.3%	38	92.7% H vs. L
		Exposure Index-by- Degreasing Chemical Exposure (Enlisted Flyer)	n	11	14	12	Overall		0.013
			Number/%						
			Abnormal	0	0.0%	1	7.1%	5	41.7% M vs. L
			Normal	11	100.0%	13	92.9%	7	58.3% H vs. L

TABLE J-4. (continued)

Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Cholesterol-HDL Ratio	Exposure Index-by-Lifetime Alcohol History	0 No	n	7	1	6			
			Number/%						
		0 Yes	Abnormal	2	28.6%	1	100.0%	4	66.7% M vs. L
			Normal	5	71.4%	0	0.0%	2	33.3% H vs. L
	Exposure Index-by-Degreasing Chemical Exposure (Officer)	>0-40 No	n	3	2	7			
			Number/%						
		>0-40 Yes	Abnormal	1	33.3%	1	50.0%	4	57.1% M vs. L
			Normal	2	66.7%	1	50.0%	3	42.9% H vs. L
	>40 No	>0-40 Yes	n	74	67	48			
			Number/%						
			Abnormal	28	37.8%	24	35.8%	21	43.8% M vs. L
			Normal	46	62.2%	43	64.2%	27	56.2% H vs. L
	>40 Yes	>0-40 Yes	n	22	25	30			
			Number/%						
		>40 Yes	Abnormal	14	63.6%	9	36.0%	11	36.7% M vs. L
			Normal	8	36.4%	16	64.0%	19	63.3% H vs. L
	>40 Yes	>40 Yes	n	8	18	18			
			Number/%						
		>40 Yes	Abnormal	0	0.0%	8	44.4%	11	61.1% M vs. L
			Normal	8	100.0%	10	55.6%	7	38.9% H vs. L
			n	13	9	13			
			Number/%						
			Abnormal	4	30.8%	2	22.2%	6	46.2% M vs. L
			Normal	9	69.2%	7	77.8%	7	53.8% H vs. L

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Trigly- cerides	Exposure Index-by- Current Alcohol Use (Officer)	0-1	n	99	91	95	M vs. L H vs. L	— —	0.105 0.740
			Adj. Mean ^a	104.0	88.7	100.7			
			95% C.I. ^a	(77.8,138.9)	(66.5,118.2)	(75.8,133.7)			
	>1-4		n	24	31	25	M vs. L H vs. L	— —	0.071 0.169
			Adj. Mean ^a	84.3	117.2	109.6			
			95% C.I. ^a	(59.0,120.5)	(84.7,162.3)	(77.1,155.9)			
	>4		n	4	0	2	M vs. L H vs. L	— —	— 0.963
			Adj. Mean ^a	65.9	—	64.2			
			95% C.I. ^a	(32.5,133.6)	—	(24.6,167.3)			
Trigly- cerides	Exposure Index-by- Lifetime Alcohol History	0 Yes	n	3	2	7	Overall M vs. L H vs. L	2.00 (0.05,78.25) — —	0.165 0.999 0.608
			Number/%						
		0 No	Abnormal	1 33.3%	1 50.0%	0 0.0%			
			Normal	2 66.7%	1 50.0%	7 100.0%			
	>0-40 Yes		n	7	1	6	Overall M vs. L H vs. L	— — —	— — —
			Number/%						
			Abnormal	0 0.0%	0 0.0%	0 0.0%			
			Normal	7 100.0%	1 100.0%	6 100.0%			

TABLE J-4. (continued)

Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Trigly- cerides (cont.)	>0-40 No	n	66	65	51	Overall			0.505
		Number/%							
		Abnormal	2	3.0%	4	6.2%	M vs. L	2.10 (0.37,11.87)	0.666
	>40 Yes	Normal	64	97.0%	61	93.8%	H vs. L	2.72 (0.48,15.50)	0.454
		n	10	12	10	Overall			0.169
		Number/%							
		Abnormal	0	0.0%	2	16.7%	M vs. L	—	0.572
		Normal	10	100.0%	10	83.3%	H vs. L	—	—
	>40 No	n	11	15	21	Overall			0.913
		Number/%							
		Abnormal	1	9.1%	2	13.3%	M vs. L	1.54 (0.12,19.47)	0.999
		Normal	10	90.9%	13	86.7%	H vs. L	1.67 (0.15,18.22)	0.999
Trigly- cerides	Exposure Index-by- Age (Enlisted Flyer)	Born ≥1942	n	11	17	11			0.332
		Adj. Mean ^a	120.4	93.0	110.9	M vs. L	—		0.781
		95% C.I. ^a	(74.5,194.8)	(62.7,137.9)	(69.4,177.1)	H vs. L	—		
	Born 1923- 1941	n	43	43	42				0.308
		Adj. Mean ^a	118.5	102.0	115.6	M vs. L	—		0.867
		95% C.I. ^a	(86.4,162.5)	(75.7,137.4)	(85.0,157.2)	H vs. L	—		
	Born ≤1922	n	0	2	0				—
	Adj. Mean ^a	—	152.5	—	M vs. L	—			—
	95% C.I. ^a	—	(56.4,412.0)	—	H vs. L	—			—

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Trigly- cerides	Exposure Index-by- Age (Enlisted Flyer)	Born ≥1942	n Number/%	11	17	11	Overall		0.207
			Abnormal	2	18.2%	0	0.0%	1	9.1% M vs. L
			Normal	9	81.8%	17	100.0%	10	90.9% H vs. L
	Born 1923- 1941	n Number/%	43	43	42	Overall		0.638	
		Abnormal	4	9.3%	2	4.7%	4	9.5% M vs. L	
		Normal	39	90.7%	41	95.3%	38	90.5% H vs. L	
	Born ≤1922	n Number/%	0	2	0	Overall		—	
		Abnormal	0	—	0	M vs. L	—	—	
		Normal	0	—	2	H vs. L	—	—	
Trigly- cerides	Exposure Index-by- Current Alcohol Use (Enlisted Groundcrew)	0-1	n Number/%	117	127	113	Overall		0.070
			Abnormal	12	10.3%	10	7.9%	3	2.7% M vs. L
			Normal	105	89.7%	117	92.1%	110	97.3% H vs. L
	>1-4	n Number/%	20	25	21	Overall		0.533	
		Abnormal	1	5.0%	0	0.0%	1	4.8% M vs. L	
		Normal	19	95.0%	25	100.0%	20	95.2% H vs. L	
	>4	n Number/%	6	3	4	Overall		0.296	
		Abnormal	0	0.0%	0	0.0%	1	25.0% M vs. L	
		Normal	6	100.0%	3	100.0%	3	75.0% H vs. L	

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Creatine Kinase	Exposure Index-by-Industrial Chemical Exposure (Officer)	Yes	n	43	41	44	M vs. L H vs. L	— —	0.820 0.052
			Adj. Mean ^a 95% C.I. ^a	144.5 (113.7,183.6)	140.9 (111.1,178.8)	117.3 (92.7,148.4)			
Creatine Kinase	Exposure Index-by-Current Alcohol Use (Officer)	No	n	84	81	78	M vs. L H vs. L	— —	0.970 0.098
			Adj. Mean ^a 95% C.I. ^a	132.4 (107.0,163.7)	132.7 (107.7,163.4)	150.7 (122.1,185.9)			
Transtuzumab	Exposure Index-by-Industrial Chemical Exposure (Officer)	0-1	n	99	91	95	Overall	0.169	0.113 0.488
			Number/%						
			Abnormal	10	10.1%	3			
	>1-4		Normal	89	89.9%	88	M vs. L H vs. L	0.30 (0.08,1.14) 0.60 (0.21,1.72)	0.342 0.510
			n	24	31	25			
			Number/%						
	>4		Abnormal	0	0.0%	3	M vs. L H vs. L	— —	— —
			Normal	24	100.0%	28			
			n	4	0	2			
			Number/%				Overall	— —	— —
			Abnormal	0	0.0%	0			
			Normal	4	100.0%	0			

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Creatine Kinase	Exposure Index-by-Age (Enlisted Flyer)	Born >1942	n Adj. Mean ^a 95% C.I. ^a	11 115.8 (80.0,167.7)	17 145.0 (107.1,196.5)	11 130.5 (91.0,187.2)	M vs. L H vs. L	— —	0.272 0.602
		Born 1923-1941	n Adj. Mean ^a 95% C.I. ^a	43 119.9 (94.0,153.0)	43 108.9 (86.5,137.0)	42 126.1 (99.5,159.8)	M vs. L H vs. L	— —	0.397 0.657
		Born <1922	n Adj. Mean ^a 95% C.I. ^a	0 —	2 158.2 (73.5,340.4)	0 —	M vs. L H vs. L	— —	— —
	Exposure Index-by-Age (Enlisted Flyer)	Born >1942	n Number/% Abnormal Normal	11 0 0.0% 11 100.0%	17 1 5.9% 16 94.1%	11 1 9.1% 10 90.9%	M vs. L H vs. L	— —	0.616 0.999 0.999
		Born 1923-1941	n Number/% Abnormal Normal	43 4 9.3% 39 90.7%	43 2 4.7% 41 95.3%	42 4 9.5% 38 90.5%	M vs. L H vs. L	0.48 (0.08,2.75) 1.03 (0.24,4.40)	0.676 0.999
		Born <1922	n Number/% Abnormal Normal	0 0 —	2 0 0.0% 2 100.0%	0 0 —	M vs. L H vs. L	— —	— —

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value	
				Low	Medium	High				
Fasting Glucose	Exposure Index-by-Lifetime Alcohol History (Officer)	0	n	10	3	13	M vs. L H vs. L	—	0.914 0.432	
			Adj. Mean ^a	100.0	98.8	94.5				
			95% C.I. ^a	(88.2,113.3)	(80.8,120.9)	(84.5,105.7)				
	>0-40		n	96	92	78	M vs. L H vs. L	—	0.248 0.757	
			Adj. Mean ^a	101.1	98.2	100.3				
			95% C.I. ^a	(94.0,108.7)	(91.5,105.4)	(93.2,108.0)				
	>40		n	21	27	31	M vs. L H vs. L	—	0.299 0.165	
			Adj. Mean ^a	105.9	100.5	113.4				
			95% C.I. ^a	(95.3,117.7)	(91.3,110.6)	(103.8,123.9)				
Fasting Glucose	Exposure Index-by-Degreasening Chemical Exposure (Officer)	Yes	n	38	36	50	Overall		0.032	
			Number/%							
			Abnormal	11	28.9%	3	8.3%	6	12.0%	
	No		Normal	27	71.1%	33	91.7%	44	88.0%	M vs. L H vs. L 0.22 (0.06,0.88) 0.34 (0.11,1.01) 0.046 0.086
			n	89	86	72	Overall		0.230	
			Number/%							
			Abnormal	7	7.9%	11	12.8%	12	16.7%	M vs. L H vs. L 1.72 (0.63,4.66) 2.34 (0.87,6.30) 0.410 0.141
			Normal	82	92.1%	75	87.2%	60	83.3%	

TABLE J-4. (continued)

Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Fasting Glucose	Exposure Index-by- Race (Enlisted Flyer)	Nonblack	n Adj. Mean ^a 95% C.I. ^a	53 98.5 (94.2,103.0)	58 104.8 (100.5,109.3)	50 96.3 (92.1,100.8)	M vs. L H vs. L	— —	0.033 0.453
		Black	n Adj. Mean ^a 95% C.I. ^a	1 111.0 —	4 96.7 (83.3,112.2)	3 129.0 (108.0,154.1)	M vs. L H vs. L	— —	0.415 0.397
	Exposure Index-by- Industrial Chemical Exposure (Enlisted Flyer)	Yes	n Number/% Abnormal Normal	39 5 34	37 9 28	35 1 34	Overall M vs. L H vs. L	2.19 (0.66,7.27) 0.20 (0.02,1.80)	0.028 0.318 0.252
		No	n Number/% Abnormal Normal	15 0 15	25 2 23	18 4 14	Overall M vs. L H vs. L	— —	0.099 0.770 0.150
Fasting Glucose	Exposure Index-by- Race	Black 0-1	n Adj. Mean ^a 95% C.I. ^a	11 96.4 (86.8,107.1)	8 131.5 (116.1,149.0)	9 95.7 (84.6,108.2)	M vs. L M vs. L	— —	<0.001 0.926
	Exposure Index-by- Current Alcohol Use (Enlisted) Groundcrew)	Black >1-4	n Adj. Mean ^a 95% C.I. ^a	2 87.8 (68.4,112.7)	2 98.7 (77.2,126.3)	3 85.1 (68.0,106.5)	M vs. L H vs. L	— —	0.511 0.853
		Black >4	n Adj. Mean ^a 95% C.I. ^a	2 80.9 (55.2,118.6)	2 91.8 (51.6,163.3)	0 —	M vs. L H vs. L	— —	0.720 —

TABLE J-4. (continued)
Summary of Exposure Index-by-Covariate Interactions for Hepatic Variables

Variable	Interaction (Occupation)	Stratification	Statistic	Exposure Index			Exposure Index Contrast	Adj. Relative Risk (95% C.I.)	p-Value
				Low	Medium	High			
Fasting Glucose (cont.)	Nonblack 0-1	n	106	119	104				
		Adj. Mean ^a	101.9	99.5	102.8		M vs. L	—	0.444
		95% C.I. ^a	(97.9,106.1)	(95.1,104.2)	(97.6,108.4)	H vs. L	—	—	0.780
	Nonblack 1-4	n	18	23	18				
		Adj. Mean ^a	96.0	97.5	86.5		M vs. L	—	0.854
		95% C.I. ^a	(87.2,105.7)	(85.5,111.1)	(75.7,99.0)	H vs. L	—	—	0.218
	Nonblack ≥4	n	4	1	4				
		Adj. Mean ^a	94.2	94.4	73.5		M vs. L	—	0.994
		95% C.I. ^a	(68.6,129.4)	(57.6,154.8)	(47.3,114.0)	H vs. L	—	—	0.370
Fasting Glucose	Exposure Index-by- Race (Enlisted (Groundcrew)	Nonblack	n	128	143	126	Overall		0.180
		Number/%							
		Abnormal	17	13.3%	10	7.0%	M vs. L	0.49 (0.22,1.12)	0.128
		Normal	111	86.7%	133	93.0%	H vs. L	0.95 (0.46,1.97)	0.999
	Black	n	15	12	12	Overall			0.009
		Number/%							
		Abnormal	1	6.7%	5	41.7%	M vs. L	10.00 (0.97,102.87)	0.087
		Normal	14	93.3%	7	58.3%	H vs. L	—	0.999

^aTransformed from natural logarithm scale.

—Adjusted relative risk not applicable for continuous analysis of a variable; analysis not done due to sparse data; summary statistics not given for exposure index categories with no participants.

^bTransformed from natural logarithm (X + 0.1) scale.

Notes: Relative risks/confidence intervals and p-values for discrete variables based on stratified, unadjusted analyses. Adjusted means/confidence intervals and p-values for continuous variables based on adjusted analyses. Small sample sizes may affect validity of overall p-value.